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ABSTRACT

This study investigated the cognitive and affective student learning outcomes of 16 semesters of a mastery learning approach in teaching high school Business and Distributive Education classes. The class handout describing mastery learning, teacher and student responsibilities, examinations, grading procedures, 5-day unit activities schedule, information sources, and learning styles are presented. Study results support the hypothesis that mastery learning produces successful learning experiences for at least 80 percent of the students. Over 90 percent of the students received a course grade of A (indicating scores of at least 90 percent on every unit examination). On an anonymous teacher/course evaluation 96 percent of the students rated their total learning as high. Mastery learning requires an extraordinary investment in teacher time for preparation and grading, but is very rewarding. All students can and will learn if: (1) they know what is expected of them; (2) they are taught in the learning style best suited to them, (3) they are given the individualized corrections needed to alleviate previous learning errors; and (4) they can be retested to demonstrate mastery of objectives. Educators must look at themselves and their methods before assuming that some students cannot be successful. (BS)

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COGNITIVE AND AFFECTIVE OUTCOMES OF MASTERY LEARNING: A REVIEW OF 16 SEMESTERS

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Introduction

Parents, teachers, students, administrators, taxpayers and employers would all like students to learn more at school. Most schools, however, still provide a successful learning experience for only 25% of their students (Block, 1974). Numerous proposals have been made in recent national reports on how to improve our schools. Their suggestions range from more money to better school buildings; from longer school days to more foreign language; from more school days to a voucher system for public and private schools. All of these miss the point. It is doubtful that these suggestions will improve students' performance. Efforts by students and teachers are what create a successful learning experience. If teachers do not improve the quality and effectiveness of their instruction students will not learn any more than they always have, regardless of how many new filmstrips they see, of the number of days or periods they go to school, or of what school they attend. Educators must learn of and practice more successful methods of teaching. Mastery learning is one such method.

This report is a followup to two previous studies (Whiting, Render & Devoe, 1979; Whiting & Render, 1982). The first was a limited study which tested the hypothesis that the implementation of a mastery learning approach to the teaching of distributive education (DE) would produce the 80% successful learning figure accomplished by earlier efforts in the finite and/or hierarchically organized subjects. The study reported that successful learning (achieving a grade of A) was achieved by 91 to 97% of the students involved. The study, however, was of limited time (one quarter), by an inexperienced teacher in a short term situation (student teaching) and included a limited sample size (n=53).

The second study (Whiting & Render, 1982) reviewed the cognitive and affective outcomes of nine semesters of a mastery learning approach with 1,279 students in DE classes. That study found successful learning (acnieving a grade of A) occurring in 94 to 98% of the students involved. The successful learning occurred in all students regardless of previous learning success or failure. The 1,279 students had an average GPA of 2.41 in school, but a 3.92 grade average in DE class. Of the students involved, 98% expressed positive feelings about the effectiveness of their learning and desire to have other classes taught via mastery learning.

Statement of the Problem

This study investigates the cognitive and affective student learning outcomes of 16 semesters of a mastery learning approach (n=2,319) in teaching Business and Distributive Education classes. The study tested the hypothesis that the implementation of a mastery learning program would produce at least 80% successful learning, even more extensively and reliably than the previous studies.

Procedure

The senior author involved in this program initially taught for six years at the 500-student Brush High School in Brush, Colorado. At that school he taught Consumer Business (CB), Business Law (BL), Economics (Econ), Distributive Education 1 (DE 1), and Distributive Education 2 (DE 2). The educator has since moved to the 550-student Glenwood Springs High School in Glenwood Springs, Colorado, where he established another Distributive Education program. At Glenwood Springs he teaches Career Shadowing (CS), DE 1, DE 2, and Coop G. Consumer Business and Career Shadowing are essentially the same one-semester sophomore course; Business

Law and Economics are a one-semester junior/senior course; Coop G is a one-year junior course; and DE 2 is a one-year senior course. No minimum GPA requirements exist for entry into any of the courses and courses are essentially open to all students. All classes are elective. Individual class size averages are CB/CS=31, BL=33, Econ=30, Coop G=12, DE 1=28, DE 2=19, with a low of 11 and a high of 37. All these classes are taught via the mastery learning approach. The particular approach used is an individual variation of that first developed by Bloom (1968).

On the first day of class, to introduce the mastery learning approach, the educator gives the following handout to each student and spends the class period (one hour) reviewing it and answering questions in an attempt to ensoure the students' understanding of mastery learning's concepts and procedures:

Mastery Learning/Teaching Strategy

1. The material will be presented in units.
2. For each unit, specific learning objectives will be written by the teacher and given to the students. These objectives are what is important to be learned in that unit.
3. For each unit, certain teacher activities and student activities will be used to present appropriate material to aid the student in learning the objectives.
4. It will take approximately 5 days to cover one unit.*
5. Mastery of the unit will be the goal.
6. Mastery of the objectives will directly lead to mastery of the unit.**
7. Mastery will be determined by taking and passing (90%) of a formative examination on the unit.
8. The formative examination will be taken from the objectives and each item on the formative examination can be directly related to a particular objective.
9. If you fail to achieve mastery from the initial taking of the formative examination, you may receive prescribed correctives*** as an aid in the alleviation of the deficiency in that area. Each objective has its own individual prescribed correctives.
10. You may retake the formative examination without penalty until mastery is achieved.

11. All retakes must be completed by the end of the second week following the presentation of the unit, or the end of the quarter, whichever comes first. Specified times when the tests may be retaken, outside of the two times the tests are offered in class, will be posted in the classroom or other arrangements can always be made with the teacher.
12. When you achieve mastery, you may utilize the time before the next unit is presented by participating in the appropriate student activity for that unit or by helping the students who have yet to achieve mastery.
13. The cycle will be repeated with each unit.
14. An individual tally sheet will be kept in your folder so that you can see at any time how you are progressing toward a particular grade. You must keep all tests in the folder. You must have a test for each unit, if credit is to be received. Any test lost must be retaken. This is your responsibility.
15. You will be graded only on what you do in regard to the objectives and grading procedures. You will not be graded in competition with other students or via some subjective criteria of the teacher's.
16. Your grade is based solely on what you achieve. It is possible for everyone to get an A. I expect everyone to get an A. Everyone can and will learn.
17. You are encouraged to make comments about the course at any time, both in manner taught and in subject matter. Make a contribution. This is your course.
18. I will try and be available all day. This is not limited to class time. I am a teacher all day, every day.
19. All formative examinations will be graded as soon as possible and never available later than the next morning.
20. I believe that everyone can learn and I will work as hard as you do to achieve that end.
21. Open discussion is urged and promoted. You need not raise your hand to speak as long as your comments are toward our current topic and not disturbing to others.
22. You need not have specific permission to leave the classroom, but only one person may leave the classroom at a time and you must take the hall pass.
23. This class will be run on an adult level.
24. There will never be any assigned homework. You and I both know what you need to learn: the objectives. It is our job to see that you learn those in whatever manner is most efficient for you. If you need to read the book to learn, you do not need me to tell you that. I am not concerned about how you learn, or the manner in which you learn, but rather that you do learn.
25. When in doubt do not hesitate to ask.
26. I will dismiss the class each day.
27. Make up work needed due to any form of absence is your responsibility. You know what is expected of you each week and what we did that day. With the grading procedure you also know what is expected of you for each week and semester. It is your job as an adult to fulfill the course requirements and seek whatever it may be that you need to do so.

*Approximate unit schedule of activities:
Obviously, this will have to be adjusted from time to time due to assemblies, vacations, longer units, etc., but it will be a guide to our accomplishment of a unit.
1st day - pass out objectives and objective fulfillment, mention appropriate text pages, teacher goes over the objectives in class.
2nd day - appropriate student activity pertaining directly to the objectives that will help the student learn the objectives.
3rd day - students will take the formative examination and mastery or non-mastery will be determined.
4th day - go over the formative examination in class, mastery students will start another student activity that utilizes the objectives learned. Non-mastery students will identify the non-learned objectives from the given objective key and these will be learned by whatever is the most efficient method for that student, whether that may be help from the teacher, reviewing the objective fulfillments, reviewing the text, going over the tests, doing problems, other students, etc.
5th day - mastery students will continue appropriate student activity. Non-mastery students will retake the formative examination and mastery or non-mastery will again be determined.
This cycle will be repeated with each unit.
Questions should be asked at any time and are encouraged.

**You will have the following sources to obtain the information you need to master each of the objectives in each unit:
text pages in the book and other books
objective fulfillment sheets
information presented by the teacher in class on Monday
notes you may take in class
questions at the end of chapters, problems, workbooks
fellow students
students' activities throughout the week
visual media
questions at any time
formative examinations
the teacher at any time
Again, you should experiment and find the way you learn the best. All will not learn best in the same manner, but everyone can learn if they find their correct learning style.

***A prescribed corrective is a fancy name for doing whatever is necessary for you to do to correct an error in the learning of an objective as was shown in the formative examination. Each question is relatable to an objective and each objective can be learned from many sources and in any one of the learning styles. After you have taken the formative examination one time and haven't mastered it (if you mastered it you apparently already know the objectives) the idea is to take the non-learned objectives and study those because you already know the others.

Grading Procedure--
Quarter grade to obtain a grade of C - all units must be mastered at a level of 70% or better.

to obtain a grade of B - all units must be mastered at a level of 80% or better.
to obtain a grade of A - all units must be mastered at a level of 90% or better.

It should be remembered that these grades are minimums for all tests and are not an average. All tests must be above 90% to get an A, for example. Remember, you must turn in all your tests in order to claim your grade.

Semester grade
A semester final will be given at the end of each semester and will be the last unit of the semester. This final can either lower, maintain or raise the semester grade you already have earned. An average of your two quarter letter grades will be made to determine your preliminary semester grade. A grade of 70-90% on the final will maintain your grade. A grade of less than 70% on the final will lower your semester grade one level. A grade of 90% or better on the final will raise your semester grade one level. The final will be taken directly from the objectives. A retake of the final will not be available.

Learning styles
Everyone learns best in a different way. There are four main learning styles:
1. Readers--those who learn best by reading.
2. Listeners--those who learn best by listening.
3. Doers--those who learn best by doing.
4. Watchers--those who learn best by watching other people do.

Everyone will learn best by one of these methods, but will learn some by all the methods. The best way to learn is to get exposure to the objectives in all the learning styles, which would logically include your way. You then can emphasize your particular style when you study.

Results

Cognitive outcomes. The following tables reflect the outcomes of 16 semesters of classes taught via the mastery learning approach. Table A shows the students' cumulative grade point average prior to entering the course and their grade average in the class taught by mastery learning. Table B shows the students' grade average on the summative examination. Table C indicates the percentage distribution of student grades in the 16 semesters in the courses taught by mastery learning.

Table A. Average grades* before and after implementation of mastery learning.

Class	n	Before Mastery Approach	End of Mastery Approach
CB/CS	795	2.36	3.88
DE 1	754	2.11	3.92
DE 2	344	2.33	3.95
Bus Law	186	2.61	3.94
Econ	194	2.64	3.90
Coop G	46	1.62	3.89
Total	2,319	x= 2.28 Overall GPA	x= 3.92 GPA in DE class

*The grades are based on a 4-point grading system where an A=4.00, B=3.00, etc.

Table B. Student grades on final summative evaluation.

Class	n	Average Grade
CB/CS	795	96.5%/3.86
DE 1	754	93.6%/3.74
DE 2	344	98.7%/3.95
Bus Law	186	97.1%/3.88
Econ	194	97.8%/3.91
Coop G	46	92.4%/3.70
Total	2,319	

Table C. Percentage distribution of student course grades (rounded to nearest whole percent).

Class	n	% Achieving Grade of A	% Achieving Grade of B	% Achieving Grade of C	% Achieving Grade of F
CB/CS	795	92	6	1	1
DE 1	754	95	2	2	1
DE 2	344	97	2	0	1
Bus Law	186	97	2	0	1
Econ	194	97	1	0	2
Coop G	46	92	5	2	1
Total	2,319				

Affective Outcomes

The non-overt indicator of affective satisfaction with mastery learning lies in the steady increase in and total number of students voluntarily enrolling in these courses. As is evidenced by the large average class size previously noted, students' desire to achieve a successful learning experience. This large enrollment is especially noteworthy considering that in both schools the Distributive Education program did not exist prior to the arrival of that educator and mastery learning. In addition, a large percentage of students take more than one class offered via this teaching method during their high school careers. This outcome also speaks well for positive feelings being generated by participation in a mastery learning class. The following responses were to an anonymous teacher/course evaluation completed by the students at the end of the course:

- 2,216 of 2,319 (96%) students rated their total learning at either 9 or 10 on a 10-point scale.
- 2,188 of 2,319 (98%) students would like to have other classes taught via mastery learning.
- 2,314 of 2,319 (99%) students felt they were going to receive the grade they deserved.

In response to "what do you like best about mastery learning," the following are some selected repeated responses:

- Why aren't all classes taught this way?
- I don't have to guess what to study.
- This is the first A I've ever gotten.
- It's easier to learn.
- I look forward to coming to class.

- I don't cut this class.

- It makes me feel special.

Discussion

The results of this study support the hypothesis that mastery learning does produce successful learning experiences for at least 80% of the students. These results accentuate the fact that, in this case, the mastery learning approach produced learning far in excess of the 80% figure from students who were not even learning at the 25% figure before their exposure to the mastery learning approach. More important, the results support the concept that mastery learning will be effective in all subjects. All students can and will learn. The students' success on the final, which is a 50-question short-answer test that cannot be retaken, illustrates the high level of retention that mastery learning produces. This success on the final also shows that students are learning throughout the semester and are remediating unlearned material even though they may not have to retake a test. Given the fact that the student must get a 90% or better on every unit, not just a 90% average to receive an A, the students are achieving a high level of learning in all units, as opposed to very high in some and lower in others.

It should be remembered, however, that the grade averages mentioned were semester grades. Grade distributions for first quarter grades were slightly lower (3-6%), and then increased as the students gained confidence and became familiar with the system and the teacher. It could also be argued that some grade average benefit may be derived from a smaller school situation.

Another positive affective comment that is worth noting is that the students take a great deal of pride in their accomplishments under mastery

learning. One fellow teacher reported that, when asked whether they learned a lot in Consumer Business, the student replied, "Of course, we had mastery learning."

Over the course of 16 semesters there have been numerous other indicators of the success of mastery learning. DE students involved in DECA have consistently not only qualified for but placed high in DECA District, State, and National contests. Of the DE students, 84% are either currently employed in business or in the process of furthering their education in this area. A maximum of 35 DE 2 students were working on the job in their senior year at Brush High School. After only two years at Glenwood Springs, 33 students are on the job. Employers consistently seek new DE 2 students as employees each year, which must be an indicator of their satisfaction with the students' learning. In fact, at the present time, there are 14 employers desiring DE 2 student employees that are not available. Numerous employers have suggested to students who have applied for prospective jobs that they take DE in high school. Over 100 of the students in DE during the 16 semesters have been children of business employers in the community. A total of 36 students have successfully CLEP-tested out of business law and received college credit without having to again take the class at college.

It should be realized that the use of mastery learning has its negative aspects with which the teacher must deal. The investment of time is extraordinary. It takes approximately 15 hours to write one complete unit and get it ready for use. Daily preparation is extensive whether it is preparing an entertaining presentation of the objectives, organizing an activity or grading 150 short answer tests in one night. The writing of higher level cognitive objectives and appropriate test questions is very difficult. Some

teachers will not understand mastery learning nor its success and will either question your methods or not be a source of positive feedback. The mastery learning teacher must be prepared to justify their students' high level of achievement to both administrators and other teachers. Many feel that only students with a previously demonstrated high aptitude are capable of learning and consequently only a small percentage of students should receive an A. One needs to work for a principal who is willing to allow teaching in the manner which works best for the individual teacher and not impose his methods or values upon one's teaching. Some students expect to fail and it is difficult to fight through this barrier that has been developed and reinforced for many years. One's success with mastery learning may make one less tolerant of poor educators, because it becomes clear that all students can learn if just taught in a correct manner. A mastery learning teacher can tend to become biased toward this method of teaching.

There are a number of items that may help a teacher that has decided to implement mastery learning deal with these problems and make the transition more successful. Go over your mastery learning strategy and rationale with your principal and ask for observation of the class for an entire unit. This way, not only will the principal know why one does as one does, but also allows the principal to see its success first hand. It may be desirable to implement mastery learning in one or two subject areas per year because of the time involved. One must sincerely believe that <u>all students can and will learn</u>! If a student is not achieving a successful learning experience it is due to the failure of the teacher. Every student can be reached if teachers are only smart enough to find the correct way. If teachers allow themselves to believe that some students are not capable

of learning, then it becomes too easy for teachers to dismiss a student's failure, and teachers may not try as hard as they should to determine that student's individual learning needs. The teacher implementing mastery learning must be willing to succeed. They must not succumb to the temptation to feel a sense of satisfaction when they give a test that a lot of their students fail. When a student tells us a course is hard, it is not a compliment. It means that we have not done a very good job of teaching and presenting the material to that particular student. Efficient and successful learning will not seem difficult to the student.

There are many advantages to mastery learning even beyond the 80% successful learning that is not only possible but fact. A teacher will receive tremendous backing and support of the student. The concern about adequate enrollment will be replaced with trying to figure out how to get more desks into your room. It is truly uplifting to see such learning success in all your students, especially those who have not felt that feeling before. It is an eye-opening revelation to realize that all students can learn. Potential for your students becomes unlimited. You will look forward to work every day, and almost feel a sense of loss at the close of school each Spring. Mastery learning teachers develop a great confidence in their own ability, possess very positive self worth and feel good about what they are doing--all of which are characteristics that all people in other careers neither necessarily possess nor have the opportunity to obtain. Because the mastery learning teacher relates achievement directly to the specific student learning objectives, being accountable for grades given or documentation of student learning ceases to become a concern. This is especially true given the students' success on the not-retakeable final examination.

This study reinforces the concept that all can and will learn if the students know what they are expected to learn, are taught in the learning style best suited to them, are given the individualized correctives needed to alleviate previous learning failures or errors, and are given the opportunity to demonstrate this new level of learning by having the opportunity to take another test over the same objectives. It seems tragic in a society that cries out for greater achievement on the part of students that mastery learning and other such approaches are used so seldom. If educators want to create high levels of learning in <u>all</u> students, they can feel secure that methods to facilitate growth and learning are available. Educators must believe that all can and will learn, they msut believe in thier own abilities, and when learning does not approach the optimal, educators must look first at themselves and their methods before they assume that some students cannot be successful.

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